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The Larvae of the Ampulicidae (Hymenoptera)

By HOWARD E. EVANS, Cornell University, Ithaca, N. Y.

The Ampulicidae form a small complex of wasps belonging to the superfamily Sphecoidea. They are variously regarded as forming a family close to the Sphecidae (Krombein, 1951), a subfamily of Sphecidae close to the Sphecinae (LeClercq, 1954), or a tribe of the sphecid subfamily Nyssoninae (Pate, 1938). Now that there has been a general review of the larval characters of the Sphecidae (Evans and Lin, 1956; Evans, 1957–59), it is appropriate to ask what light the larvae of the ampulicids may shed upon their relationships.

THE LARVA OF AMPULEX

To my knowledge no larva of this genus has ever been described in detail, and I therefore present a description of the larva of the North American species *canaliculata* Say. Terminology is the same as that employed in the recent study of sphecid larvae cited above.

Ampulex canaliculata (Say)

The following description is drawn from a single full-grown, non-diapausing specimen collected by K. V. Krombein at Kill Devil Hills, Dare Co., N. C., Aug. 12, 1958.

Body.—Length 7.5 mm.; maximum width 2 mm. (fig. 3). Fusiform, more gradually tapered anteriorly than posteriorly. Pleural lobes moderately strong; each segment divided dorsally into an anterior and a posterior annulet; anal segment small,

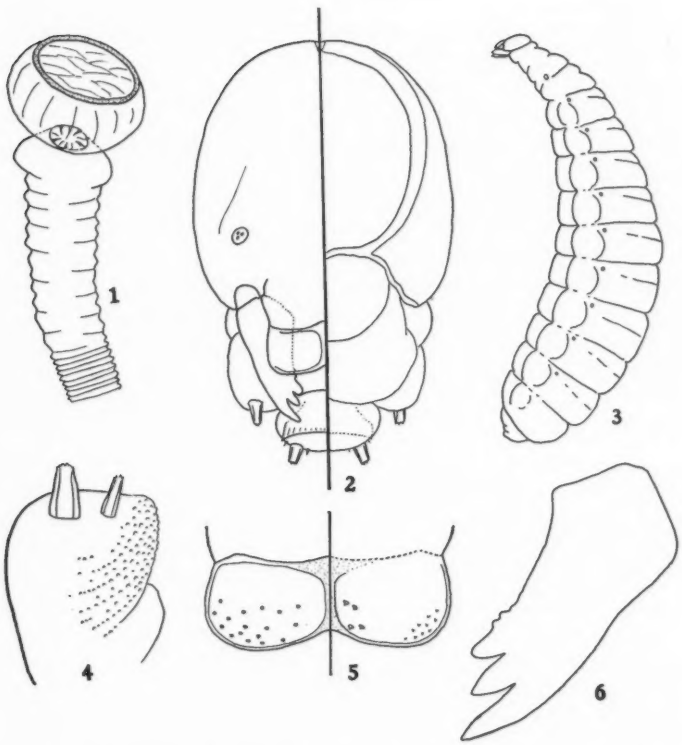
slightly produced apically, the anus situated on the ventral side of this apical process. Body setae apparently absent; integument smooth. Spiracles relatively large, the peritreme narrowly but darkly pigmented; walls of the atrium only very weakly sculptured; opening into the subatrium small, armed with a few spines; subatrium elongate, leading directly into the trachea (fig. 1).

Head.—Distinctly higher than wide; width .43 mm.; height (exclusive of labrum) .46 mm. (fig. 2). Virtually unpigmented except for the mandibles. Coronal suture forming a small notch at the top of the head; parietal bands faintly indicated; epistomal suture absent; punctures and setae apparently absent. Antennal orbits widely separated, circular, 40 μ in diameter, each with three small sensory cones set in the membrane of the orbit.

Mouthparts.—Labrum .25 mm. wide, broadly emarginate apically, with a narrow border and a lightly pigmented median band; disc with numerous punctures, some of which bear very short setae; epipharynx weakly spinulose on the sides, with four conspicuous sensory cones on each side of the midline (fig. 5). Mandibles .22 mm. long, .11 mm. wide at the base, without any setae or sensory pores, the apex with three teeth and two small denticles basad of the basal tooth (fig. 6). Maxillae weakly spinulose on the inner margin; palpi large, about 40 μ long; galeae more slender, about 30 μ long; sides of maxillae without noticeable setae or punctures (fig. 4). Labium fairly broad apically; spinneret a transverse slit .16 mm. long, its lips more prominent laterally than medially; labial palpi stout, about 30 μ long.

A second specimen, from Ithaca, N. Y., July 24, 1954 (C. M. Yoshimoto) resembles the North Carolina specimen closely but is not as well preserved. It is slightly larger, the head capsule measuring .48 mm. in width; the mandibles measure .23 mm. long and have a single sharp denticle basad of the basal tooth.

Williams (1929) has presented an excellent account of the biology of *canaliculata,* including a sketch of the larva feeding on a cockroach. Williams (1942) has also studied *A. compressa* (Fabr.) and presented some notes and sketches of the



Ampulex canaliculata (Say). Fig. 1. Anterior thoracic spiracle. Fig. 2. Head, anterior aspect on left side, posterior on right. Fig. 3. Body, lateral view. Fig. 4. Maxilla. Fig. 5. Labrum, upper surface on left, under surface (epipharynx) on right. Fig. 6. Mandible.

larva of that species. The head is shown as being differently shaped than in *canaliculata* and the labium broader, with the spinneret a long slit with the lips uniformly raised throughout. The mandibles bear a close resemblance to those of *canaliculata*.

The Larva of Dolichurus

Maneval (1939) has provided a description and series of figures of the diapausing larva of *Dolichurus corniculus* (Spinola). The head is broader than in *Ampulex* and the parietal bands longer, although very pale; the antennal orbits each bear five sensory cones rather than three. The labrum bears some strong setae and apparently lacks the marginal and median bands of *Ampulex*. The mandibles are bidentate apically and have two small denticles basad of the second tooth. The maxillae bear conspicuous setae laterally and the surface is covered with minute spinules; the palpi and galeae are about as in *Ampulex*. The labial palpi are unusually short, the spinneret a transverse slit with the lips much more prominent laterally than medially.

Discussion

The larvae of the Ampulicidae clearly have many characters in common with the Sphecinae: the body form is similar and the integument lacks setae; the spiracular peritreme is narrow and pigmented, the opening into the subatrium armed with spines; antennal papillae are absent; the labrum is broad, emarginate, and in *Ampulex* has a pigmented margin much as in the Sphecini; the mandibles are strongly dentate apically and lack basal setae; the galeae are large, the lacinial area spinulose and directed mesad; the spinneret is a transverse slit with raised lips. They bear less resemblance to the larvae of other Sphecidae, but they do have certain characters in common with the Pemphredonini: the antennal orbits are large and widely separated; the labrum has a pigmented median band and a thickened, non-bristly margin; the epipharynx has a few sensory cones but is otherwise bare except for a few lateral spinules. I consider the Sphecinae and the Pemphredonini the most primitive groups of Sphecidae, in that order (Evans, 1959).

The larvae of the Ampulicidae may be separated from those of the Sphecinae on the following characters: the integument is devoid of spinules; the parietal bands are weak; the epiphar-

ynx is spinulose only on the sides, and there very weakly; the mandibles lack basal pores; the inner margin of the maxillae bears only short spinules; and the lips of the spinneret generally project farther laterally than medially.

Larval characters suggest that the relationship between the ampulicids and the Sphecinae is very close indeed. Like many Sphecinae, the ampulicids use orthopteroids as prey, and their nesting behavior, although primitive, is not notably different from that of some Sphecinae. Only on adult structure do the ampulicids stand sharply apart from the Sphecinae, for it is impossible to reason away the forked process on the mesosternum of the ampulicids or the great reduction (or complete loss) of the anal lobe of the hind wing. Whether to regard the group as a separate family or as a subfamily close to the Sphecinae will remain a matter of opinion. Clearly the group has no close relationship to the Nyssoninae.

References

Evans, H. E. 1957–59. Trans. Amer. Ent. Soc., 83: 79–117; 84: 109–139, and in press.

—— and Lin, C. S. 1956. Trans. Amer. Ent. Soc., 81: 131–153; 82: 35–66.

Krombein, K. V. 1951. U. S. Dept. Agri. Monogr. no. 2, pp. 937–938.

Leclercq, J. 1954. Monographie systématique . . . des hyménoptères crabroniens. Liège. P. 21.

Maneval, H. 1939. Ann. Soc. Ent. France, 108: 55–57.

Pate, V. S. L. 1938. Trans. Amer. Ent. Soc., 64: 119.

Williams, F. X. 1929. Proc. Hawaiian Ent. Soc., 7: 318–329.

——. 1942. Proc. Hawaiian Ent. Soc., 11: 221–233.

Notes on Neodiprion swainei Middleton in Minnesota (Hymenoptera: Diprionidae)

By Rudolph T. Franklin, Division of Plant Industry, State of Minnesota, University of Minnesota, St. Paul 1, Minnesota

Wallace and Sippell (1958) reported believing Swaine's jack pine sawfly, *Neodiprion swainei* occurs throughout the range of jack pine, *Pinus banksiana* Lamb.

The author, John Kroeber, and Jacob Liche, on August 19, 1958, while examining jack pine stands in the Chippewa National Forest, near Cass Lake, Minnesota, collected a sawfly with which we were not familiar. It was later determined by D. R. Wallace to be *N. swainei*. This is the first record of this sawfly in Minnesota.

Later surveys extended the area of known distribution to Hubbard County (Nevis) and Crow Wing County (Brainerd), Minnesota. We can assume from this rather extensive distribution and its occurrence in Ontario that the sawfly is present throughout much of the jack pine area of Minnesota.

References

Wallace, D. R., and W. L. Sippell. 1958. Jour. Econ. Ent., 51 (2): 125.

Ethological Observations on Some Bees of Southeastern Arizona and New Mexico (Hymenoptera: Apoidea)

By E. G. Linsley and P. D. Hurd,[1] University of California, Berkeley

Bees Associated with *Mentzelia pumila*

Among the more striking cases of physiological and ethological adaptations of bees to their pollen source, is the synchronization of their diurnal activity with special times of pollen availability. Linsley (1958) has reviewed some examples among the crepuscular, nocturnal, and matinal bees, especially those associated with flowers of Onagraceae and Cucurbitaceae. He also records the observations of P. H. Timberlake that *Perdita* species of the *wootonae* group collect pollen from *Mentzelia* (Loasaceae) near sundown in Arizona and New Mexico during the fall, in the middle of the afternoon at Blythe, California, in April, when the flowers apparently open earlier in the day.

In the first week of September, 1958, we had an opportunity to observe the behavior of bees associated with *Mentzelia pumila* (Nutt.) T. & G.[2] growing along the roadway, six miles east of Portal, Cochise County, Arizona. At this season, the *Mentzelia* plants were coming into bloom at about 3:40 p.m. MST. Subsequently they were visited for pollen by at least 10 species of bees.[3] The majority of these, although present on each of several evenings, were not numerous, and probably took advantage of the available *Mentzelia* pollen after working other sources during the remainder of the day. Included in this group were: *Anthophora urbana* Cresson, *A. californica* Cresson, *Agapostemon angelicus* Cockerell, *Lasioglossum pruinosiforme* (Craw-

[1] The authors are indebted to M. A. Cazier, Director, Southwestern Research Station, Portal, Arizona, for making the facilities of the Station available as a base for the studies here reported and for other related projects.

[2] The plant identifications used in this paper were kindly made by Helen K. Sharsmith, University of California Herbarium, Berkeley.

[3] Identifications of the bees were made or confirmed by P. H. Timberlake, Citrus Experiment Station, University of California, Riverside.

ford), *L. microlepoides* (Ellis), *L. sisymbrii* Cockerell, *Melissodes paroselae* Cockerell, *M. tristis* Cockerell, etc. Two species of *Bombus, B. sonorus* Say and *B. nevadensis nevadensis* Cresson, although polylectic like some of the other bees mentioned, did show a special interest in *Mentzelia* and were observed trying to force the flowers open at various times of day. However, three species of solitary bees appeared to have a definite association and synchronization in their diurnal activity with the daily blooming period of the *Mentzelia* flowers. These were *Anthophora montana* Cresson, *Anthidium porterae* Cockerell, and *Perdita mentzeliae* Cockerell. Observations on the behavior of each of these were made as follows:

Anthophora montana Cresson, in early September was represented at the flowers only be females. These were occasionally seen during the day taking nectar from *Asclepias, Monarda, Helenium,* and other flowers but were not observed gathering pollen from any plants but *Mentzelia.* These bees begin to arrive in the area shortly before the *Mentzelia* flowers open, pausing for nectar on other plants while waiting, and begin to gather *Mentzelia* pollen as soon as it is available. They are aggressive toward the other bees, especially *Anthidium* and *Bombus* and chase them off and away from the flowers with physical contact and sometimes pursuit. They also flew up about the head and face of the observer but did not attack. When approaching a flower they do so with the tongue extended. They tend to poise, hovering in front of a flower, work it two or three times from this position, and then move to another blossom. They are very active and produce a humming sound while flying and collect pollen until after sunset.

Anthidium porterae Cockerell was represented by both sexes, and since the flowers were the site of mating, males arrived before the flowers opened and waited for the females. The latter were about equally abundant with the *Anthophora* and were active about equally long. Mating took place while the females were gathering pollen and usually lasted for about half a minute with the female remaining quiescent. Mating pairs were seen throughout the period of female activity, suggesting that indi-

viduals may mate more than once. Males not only pounced upon female *Anthidium,* but also upon *Anthophora* and *Bombus* and appeared to exert a disturbing influence on pollen collecting activities but probably no more so than the aggressiveness of female *Anthophora.* The nesting habits of this species have been described by Hungerford and Williams (1912), Hicks (1926), and Custer and Hicks (1927).

Perdita mentzeliae Cockerell, appeared among the *Mentzelia* flowers considerably later than the larger bees and were more difficult to observe. Both sexes were present on the flowers but no mating pairs were seen.

The activity observed about the flowers on the afternoon of September 2, 1958, was as follows:

3:35 p.m. Scattered clouds but warm and bright. Flowers closed.

3:41 p.m. Few *Anthidium* and *Anthophora* flying among the plants. First flowers beginning to open.

3:48 p.m. Large numbers of *Anthidium* and *Anthophora* flying among the flowers and making a clearly audible hum as a group. Many flowers now opening and first females of *Anthidium* and *Anthophora* taking pollen along with workers of both species of *Bombus.*

4:10 p.m. Approximately 20 per cent of flowers open, remainder mostly flaring. Bees about same level of abundance.

4:15 p.m. *Perdita* evident. Female *Anthophora* noted chasing *Anthidium* away from flower being visited by former. *Anthophora* appear more numerous.

4:20 p.m. Approximately 40 per cent of flowers open. Activity of *Anthophora* and *Perdita* increased.

4:22 p.m. Open flowers increasing in number. Mating pair of *Anthidium* commenced with buzz at union, remained quiescent and in copulo for 40 seconds during which female cleaned mouthparts, then separated rapidly and flew in opposite direction.

4:25 p.m. Approximately 60 per cent of flowers open and some individual plants with all flowers open. *Anthophora* very abundant.

4:27 p.m. *Anthidium* pair mated on flower for 35 seconds from union to separation, the female cleaning mouthparts as noted previously.

4:35 p.m. Thin overcast partially obscuring sun. *Anthidium* pair mating in same pattern for 29 seconds.

4:45 p.m. Female *Anthophora* chased off female *Anthidium* from flower several times. Another mating pair of *Anthidium* observed—the time 36 seconds, the female taking nectar.

4:50 p.m. Mating of *Anthidium* initiated on flower but pair fell to ground and completed act in 30 seconds.

4:52 p.m. *Anthophora* female pursued *Bombus* for from 25 to 30 ft. Another seen chasing a female *Anthidium*, a male of the latter not pursuing *Bombus*.

5:00 p.m. First female *Agapostemon* seen taking pollen, another at 5:03 p.m. *Anthophora* flew up to investigate observer. Male *Anthidium* contacted *Bombus* then took off to pursue female *Anthidium*. Several mating pairs seen, one timed at 31 seconds. One female *Anthidium* followed observer for from 35 to 40 seconds.

5:03 p.m. Sun almost completely hidden by overcast.

5:08 p.m. Male *Anthidium* pounced on back of female *Anthophora* but took off again quickly.

5:15 p.m. Male *Anthidium* knocked large *Bombus sonorus* worker to ground twice, another pounced on a female *Melissodes*.

5:22 p.m. Clouds break but sun nearly setting. Female of *Zodion obliquefasciatum* seen in pursuit of *Anthophora*. Male *Anthidium* pounced on female *Anthophora*, another knocked *Bombus* to ground but latter returned to same plant and resumed collecting pollen. A second male *Anthidium* struck the same bumblebee without chasing it away from the plant.

5:30 p.m. *Melissodes* now also taking pollen as is *Agapostemon* and numerous *Perdita.* Male *Anthidium* attempted copulation with female on flower but was frightened away. Female lay on her side in flower for several seconds, then flew off.

5:40 p.m. Sun setting. *Anthidium* mating, *Bombus, Agapostemon, Melissodes, Anthophora* all taking pollen, but latter in smaller numbers than earlier. Some new flowers beginning to open near tips of branches.

5:45 p.m. Another *Anthidium* pair mating.

5:47 p.m. Large flurry of *Anthophora* activity. Wind gusty and light growing weaker. Thunderclouds building up.

5:52 p.m. New flowers still opening. Mating *Anthidium* observed. *Perdita* becoming scarce.

5:56 p.m. No *Perdita* evident.

6:00 p.m. *Anthidium* still abundant. *Bombus* active.

6:07 p.m. Mating *Anthidium.*

6:08 p.m. Beginning to rain but *Anthidium* and *Anthophora* still taking pollen in spite of large drops falling.

6:12 p.m. Bees left flowers suddenly as intensity of storm increased.

Matinal Bees at Granite Pass, New Mexico

On August 22, 1958, Granite Pass, Hidalgo County, New Mexico, was visited in search of bees active at dawn. When we arrived it was still dark and a cold wind was blowing. There had been a heavy rain during the night and the ground was soaked and the vegetation wet. Nevertheless, we could hear bees noisily flying about. When it was light enough to see, these proved to be females of *Centris caesalpiniae* Cockerell visiting *Kraemeria* for nectar, and males of *Caupolicana yarrowi* (Cresson) and females of *Martinapis luteicornis* (Cockerell) visiting *Larrea divaricata* Cav. for nectar and pollen respectively. In spite of the cold temperature the bees were very active, flying fast, and difficult to capture.

Mating Habits of *Dianthidium*

Dianthidium ulkei perterritum Cockerell was very abundant near Portal, Cochise County, Arizona on flowers of *Haplopappus gracilis* (Nutt.) Gray, *Aster tanacetifolius,* HBK., *Helianthus* and *Heterotheca subaxillaris.* Mating pairs were observed on the flowers throughout the day on August 17, 1958, between 9:55 a.m. MST and 3:20 p.m. when it clouded up for a thunderstorm. One pair was timed at 163 seconds from contact to separation. During copulation the female stopped collecting pollen but rotated slowly extracting nectar from each nectary. The male performed a continuous pumping motion with the abdomen and as soon as this ceased the pair separated and flew off in opposite directions. The mating habits of *Dianthidium curvatum sayi* Cockerell have been described by Custer and Hicks (1927). This species mates for a somewhat shorter period of time (60–65 seconds), at both the nest site and on flowers, and one female was seen to mate twice in three days.

Literature Cited

Custer, C. P., and C. H. Hicks. 1927. Nesting habits of some anthidiine bees. Biol. Bull., 52: 258–277.

Hicks, C. H. 1926. Nesting habits and parasites of certain bees of Boulder County, Colorado. Univ. Colorado Studies, 15: 217–252.

Hungerford, H. B., and F. X. Williams. 1912. Biological notes on some Kansas Hymenoptera. Ent. News, 23: 241–260, pls. 14–16.

Linsley, E. G. 1958. Ecology of solitary bees. Hilgardia, 27: 543–599.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part XX

By Charles P. Alexander, Amherst, Massachusetts *

The preceding part under this general title was published in Entomological News, 70: 47–54. The majority of the species considered at this time were taken by the writer, chiefly in California. A few further species from other sources are acknowledged in the text. All types of new species and subspecies are retained in my personal collection.

Tipula (Yamatotipula) tenuilinea new species

Allied to *albocaudata;* mesonotal praescutum grayish brown, with four scarcely differentiated grayish brown stripes that are very narrowly margined by medium brown to form six narrow lines; wings weakly tinged with brown, stigma dark brown, conspicuous; abdominal tergites with two pale brown stripes, very narrowly separated by a yellow median line, outer segments darkened; male hypopygium with the apex of the outer dististyle truncated, the lower margin dilated at near midlength; inner style with the beak and outer basal lobe subequal in size and appearance.

♂. Length about 17–19 mm.; wing 16.5–19 mm.; antenna about 5.5–6.5 mm.

Frontal prolongation of head obscure yellow, including the elongate nasus; palpi light brown, terminal segment darker. Antennae relatively long, as shown by the measurements; scape, pedicel and basal half of first flagellar segment yellow, remainder of organ brownish black; flagellar segments moderately incised. Head gray, more whitened on front and anterior part of vertex; posterior vertex with a brown central area, the sides, with the genae, clouded with darker.

* Contribution from the Entomological Laboratory, University of Massachusetts.

I am greatly indebted to the National Science Foundation for financial assistance in conducting field studies in California in 1957.

Pronotum pale, vaguely patterned with darker. Mesonotal praescutum with the ground light gray or grayish brown, with four scarcely differentiated gray or grayish brown stripes that are very narrowly margined with medium brown, forming six narrow lines, with indications of a still further central vitta; scutum gray, the lobes patterned with brown, the smaller anterior area darker; scutellum buffy, parascutella testaceous; postnotum pale gray. Pleura almost uniformly light gray; dorsopleural membrane pale yellow. Halteres with stem brownish yellow, knob infuscated. Legs with coxae light gray; trochanters yellow; femora yellow, tips narrowly but conspicuously blackened, the amount subequal on all legs; tibiae yellowish brown, tips very narrowly and inconspicuously darker; tarsi brown, claws simple. Wings weakly tinged with brown, prearcular and costal fields, especially cell *Sc,* more yellowed; stigma large, dark brown, conspicuous; anterior cord, *m-cu* and distal section of *Cu* narrowly seamed with brown; central part of disk, especially cell *M,* paler than remainder of ground; veins brown, more yellowed in the brightened fields. Venation: Petiole of cell M_1 variable in length, in cases very short.

Abdominal tergites chiefly covered by two broad pale brown stripes that are very narrowly separated by a yellow median line; sternites more yellowed; outer segments, especially eight and nine, more darkened. Male hypopygium with the posterior border of the ninth tergite produced into an elongate median lobe that is split for approximately one-half its length into two lobules, their apices with blackened points. Outer dististyle elongate, pale, truncated at apex, lower margin beyond midlength strongly dilated; base and posterior margin on more than the proximal half with very long and conspicuous black setae, these pale and inconspicuous on outer half. Inner dististyle complex, the beak and outer basal lobe of somewhat similar shape and size, the latter somewhat longer, densely covered with setulae; dorsal crest forming an irregular obtuse lobe, not appearing as a spinous point, as in *edmundsi,* outer part with a row of short setae, near base with a row of short setae, still nearer base with several longer setae from strong basal tubercles.

Habitat. WESTERN UNITED STATES. *Holotype:* ♂, Castle Crags State Park, Shasta County, CALIFORNIA, 2,000 feet, July 5, 1953 (Alexander). *Paratypes:* ♂, Pullman, Washington, June 6, 1907 (Melander), determined as *cognata* by Melander; ♂, Odell Lake, Klamath County, Oregon, August 6, 1948 (Alexander); ♂, Intake Camp, Bishop Creek, Inyo County, California, 8,000 feet, July 8, 1957 (Alexander); ♂, Zion National Park, Washington County, Utah, May 13, 1936 (B. E. Rees).

The Utah record had previously been recorded as being *cognata* (Alexander, Amer. Midl. Nat., 39: 20; 1948); the Oregon specimen also as being *cognata* (Alexander, l.c., 51: 27; 1954). In the 1948 paper, the male hypopygium had been figured, under the name *cognata.* It can be seen that the present fly has been confused under the name *Tipula* (*Yamatotipula*) *cognata* Doane, 1901, to which it is closely allied. Of the four most similar regional species, *T.* (*Y.*) *cognata* and *T.* (*Y.*) *edmundsi* Alexander, have the praescutal pattern generally alike, differing markedly from that of *T.* (*Y.*) *albocaudata* Doane and the present fly, which are approximately similar to one another in this respect. All four flies differ further from one another in the details of structure of the male hypopygium.

Tipula (Oreomyza) cylindrata barda new subspecies

♂. Length about 13 mm.; wing 14 mm.; antenna about 4 mm.

Close to typical *cylindrata* Doane, differing in slight details of the male hypopygium. Ninth tergite with the lateral lobes much more broadly truncate, the median notch wider, on either side produced into a low blackened lobe, so that the general outline of the posterior emargination appears as shallow lateral notches and a deeper central one. In *cylindrata,* the lateral tergal lobes are narrow, the posterior emargination shallow, with a deep and narrow median notch, the lateral lobes on sides of the median notch lacking. Vestiture of outer basal lobe of inner dististyle relatively short and dense, black; in the typical race longer and yellow.

Habitat. CALIFORNIA. *Holotype:* ♂, Tub Canyon, Borrego State Park, San Diego County, 1,100 feet, March 23, 1947 (Crickmer).

I am indebted to my long-time friend, Noël Crickmer, for many interesting crane-flies from Borrego.

Tipula (Lunatipula) filamentosa new species

Belongs to the ***unicincta*** group; size large (wing of male 22 mm.); mesonotal praescutum brownish gray with four conspicuous dark brown stripes, the humeral and lateral borders broadly paler brown; tips of femora narrowly blackened; wings grayish brown, vaguely patterned with darker brown and subhyaline; male hypopygium with the tergite produced into two narrow lobes, the divergent tips subacute; phallosome with a small unpaired gonapophysis that divides at apex into two slender needlelike points, the paired apophyses appearing as longer simple rods; eighth sternite conspicuously ornamented with hair brushes and groups, including a major fasciculate seta at apex of each lateral lobe; median area with an anterior central cushion with relatively few setae that are expanded at tips into pale blades, each further produced into five or six hairlike filaments.

♂. Length about 20 mm.; wing 22 mm.

Frontal prolongation of head elongate, fully equal to remainder of head, dark brown above, including the short nasus, obscure yellow or brownish yellow at base and sides; palpi black. Antennae with scape and pedicel obscure yellow, basal flagellar segments bicolored, brownish black on proximal ends, the outer half obscure yellow, on about the fourth segment becoming uniformly darkened; basal enlargements small; verticils subequal to the segments. Head brownish gray, clearer brown behind; vertical tubercle low and inconspicuous; sides of vertex with conspicuous setae, the posterior ones more delicate.

Pronotal scutum light brown, with conspicuous black setae; scutellum light yellow. Mesonotal praescutum brownish gray, with four conspicuous dark brown stripes, the intermediate pair narrower than the central interspace; lateral stripes narrow,

widely separated from the intermediate pair; humeral region and lateral borders broadly paler brown; pseudosutural fovea a small circular depression; scutum brownish gray, restrictedly more yellowed at midline, each lobe patterned with brown; scutellum brownish gray; mediotergite obscure brownish yellow behind, vaguely more darkened in front. Pleura chiefly brown, darker on the anepisternum, paler on the meron. Halteres with stem brown, narrowly yellow at base, knob darker, obscure yellow at tip. Legs with the coxae light brown; trochanters obscure yellow; femora obscure yellow, tips narrowly but conspicuously black, the amount subequal on all legs; tibiae obscure yellow, tips more narrowly dark brown; tarsi brownish yellow, outer segments passing into dark brown; claws of male conspicuously hairy, toothed. Wings with the ground pale grayish brown, vaguely patterned with darker brown and subhyaline; darker areas include the very small stigma and a seam over *m-cu* and adjoining parts of vein *Cu*; less evident darkenings at arculus and at outer end of vein *2nd A*; the pale marks include the obliterative area, costal field, narrow seams along veins *R and M*; narrow pale streams at and near the Anal veins; veins brown to brownish yellow. Venation: Petiole of cell M_1 subequal to m; M_{3+4} subequal to basal section of M_{1+2}.

Abdomen obscure brownish yellow, tergites with very interrupted median and lateral stripes, on the intermediate segments almost restricted to the basal rings; hypopygium obscure brownish yellow. Male hypopygium with the elongate tergite narrowed posteriorly, the caudal margin with a narrow U-shaped median notch and two narrow lobes with slightly divergent subacute tips; a conspicuous dorsal furrow. Ninth sternite with a short massive lobe, its outer dorsal part produced into a knob that is tipped with a brush of reddish setae. Outer dististyle spatulate at outer end. Inner style with the beak more slender than the obtuse blackened lower beak; dorsal crest conspicuous, greatly produced backward, ending opposite or beyond the level of the obtuse outer basal lobe. Phallosome with a pair of simple elongate gonapophyses and an unpaired median one that is only about one-half as long, appearing as a depressed-flattened blade

that divides at apex into two slender needlelike points, the apical notch U-shaped. Eighth sternite large and sheathing; lateral lobes stout, each tipped with a very powerful fasciculate bristle; inner margin of lobe with numerous tubercles that bear strongly recurved simple setae; median area with a more cephalic densely setiferous area that is provided with long simple reddish bristles and a low outer central cushion that bears relatively few long modified setae, each dilated at apex into a pale triangular blade that is farther produced into five or six long hairlike filaments.

Habitat. CALIFORNIA. *Holotype:* ♂, Glacier Lodge, Big Pine Creek, Inyo County, 7,800 feet, July 10, 1957 (Alexander). On dry sage-covered hillsides, associated with *Tipula* (*Lunatipula*) *leiocantha* Alexander and *T.* (*L.*) *mono* Alexander.

Allied species having an unpaired expanded or forked gonapophysis in the male phallosome include *Tipula* (*Lunatipula*) *bigeminata* Alexander, *T.* (*L.*) *diacanthophora* Alexander, *T.* (*L.*) *sagittifera* Alexander, and *T.* (*L.*) *spatha* Doane, all distinct from the present fly in the shape of the gonapophysis and armature of the eighth sternite.

Limonia (Dicranomyia) melanderi tharpiana new subspecies

♂. Length about 6–6.5 mm.; wing 6–6.5 mm.

Characters as in the typical form, from Idaho, differing chiefly in characters of the male hypopygium. Basistyle with the outer fingerlike lobe stronger. Apex of rostrum of ventral dististyle short, narrowed outwardly, subequal to or only a little longer than the rostral spine. Gonapophysis with mesal apical lobe short, more or less triangular in outline, quite different from the condition in the typical race where they are long and sinuous.

Habitat. CALIFORNIA. *Holotype:* ♂, Sequoia National Park, Log Meadow, Tulare County, July 19, 1946 (Alexander). *Paratopotypes,* ♂♂, Dorst Camp Ground, Sequoia National Park, 6,800 feet, July 19, 1946, July 18, 1957 (Alexander); Hatchet Pass, Burney, Shasta County, 4,000 feet, July 9, 1947 (Alexander); Eureka Valley Forest Camp, Middle Fork of Stanislaus River, Tuolumne County, 6,100 feet, June 28, 1957 (Alexander).

The subspecies is dedicated to Hale Tharp, who discovered and named the "Giant Forest" of Sequoia National Park in 1858.

Dicranota (Plectromyia) reducta tehamicola new subspecies

♂. Length about 4.5–5 mm.; wing 0.8–1.5 mm.

♀. Length about 4.5–5.5 mm.; wing 0.8–1.5 mm.

Fully-winged individuals—Length 4.5–5 mm.; wing 6–6.5 mm. Intermediate stenopterous specimens—Wing 2–2.3 mm.

Generally similar to *reducta* Alexander and considered as representing a race of the same. General coloration of thorax yellow, more or less pruinose, the mesonotum infuscated medially. Wings greatly reduced in both sexes, as shown by the measurements; in a small proportion of individuals, fully-winged specimens and others with wings intermediate in length occur. Male hypopygium generally as in typical *reducta*. Ninth tergite with the median lobe parallel-sided, its apex weakly emarginate; lateral tergal arms projecting caudad beyond the level of the apex of the median lobe, expanded into a weak head. Basistyle with both apical spines of the interbases slender, slightly unequal in length. Dististyle with basal half narrower than in reducta.

Habitat. CALIFORNIA. *Holotype:* ♂, Kings Creek Meadows, Lassen Volcanic National Park, Shasta County, 7,500 feet, July 7, 1947 (Alexander). *Allotopotype:* ♀. *Paratopotypes:* Several of both sexes, July 6–7, 1947, July 21–23, 1950 (Alexander).

The subspecific name is derived from Tehama, the Indian name for Mount Lassen.

Hexatoma (Eriocera) dayana new species

Allied to *velveta;* size small (wing of male less than 10 mm.); antennae short, outer two segments reduced, their combined length less than one-half the stouter antepenultimate segment; mesonotal praescutum with four black stripes, the intermediate pair narrowly separated; praescutal vestiture sparse and pale; legs black, femoral bases broadly yellow; wings brownish yel-

low, patterned with darker brown, including the costal border and wing tip; *Rs* relatively short, inner end of cell *1st* M_2 not arcuated; outer radial branches with macrotrichia; abdomen black, lateral borders narrowly brownish yellow; hypopygium small, dark reddish brown.

♂. Length about 10 mm.; wing 9.5 mm.; antenna about 3 mm.

Rostrum and palpi black. Antennae of male short, as shown by the measurements, black throughout; 8-segmented, outer two segments reduced, the ultimate a little longer, the two combined less than one-half the length of the stouter antepenultimate; vestiture of the four enlarged flagellar segments consisting of strong setae, those of the lower face more numerous than in *dorothea*. Head brownish black, sparsely pruinose; vertical tubercle small; vestiture including stouter black proclinate bristles and pale slender setae.

Pronotum black, sparsely pruinose. Mesonotal praescutum light gray, with four conspicuous black stripes, the intermediate pair narrowed posteriorly, not reaching the suture, lateral stripes polished; praescutum with very sparse pale setae on the interspaces only; scutum gray, scutal lobes extensively brownish black, bordered by paler brown, suture polished black; posterior sclerites of notum sparsely pruinose, the posterior half of mediotergite black. Pleura and ventral half of pleurotergite heavily light gray pruinose; dorsopleural membrane brown. Halteres with stem yellowish brown, knob dark brown. Legs with coxae light gray; trochanters yellowish brown; remainder of legs black, the femoral bases conspicuously yellow, involving about the proximal three-fifths of the segment. Wings with the ground brownish yellow, conspicuously patterned with darker brown, including cells *C* and *Sc*; other dark areas include the stigma, seams at origin of *Rs*, cord and outer ends of anal veins; other paler darkenings include the broad wing tip and seams over most of the veins, restricting the ground to the centers of the cells; veins dark brown. Outer radial branches with macrotrichia, including both sections of R_5, more numerous at near midlength of the sections, lacking at the outer ends. In

dorothea, the trichia of veins beyond cord very sparse, occurring as short series on both sections of R_5. Venation: *Rs* evidently shorter than in *dorothea,* only a little longer than vein R_4; inner end of cells *1st* M_2 not arcuated, the cell subequal to the distal section of vein M_{1+2}; *m-cu* and distal section of Cu_1 subequal.

Abdomen black, subnitidous, lateral borders narrowly brownish yellow; hypopygium small, dark reddish brown.

Habitat. CALIFORNIA. *Holotype:* ♂, Waddell Creek, Santa Cruz County, May 19, 1951 (W. C. Day).

This distinct fly is named for the collector, Mr. William C. Day, student of the Ephemeroptera. It is readily told from other species that are allied to *Hexatoma* (*Eriocera*) *velveta* (Doane) by the pattern of the wings, including the darkened costal border. The most similar species, in nature of leg patern, is *H.* (*E.*) *dorothea* Alexander, of Oregon, which differs in details of size, structure of the antennae, trichiation of the wing veins, and in other characters that are indicated in the description.

Rhabdomastix (Sacandaga) megacantha new species

General coloration yellow: mesonotal praescutum, scutum and pleura patterned with brown, antennae short, flagellum black; legs pale brownish yellow; wings subhyaline, outer veins with conspicuous macrotrichia; vein R_3 perpendicular; *m-cu* only a short distance beyond the fork of M; abdomen yellow, the segments with basal brown rings; male hypopygium with the apical spine of the outer dististyle large, decurved; gonapophysis with outer end slightly expanded, the tip subacute.

♂. Length about 5.5 mm.; wing 6.5 mm.; antenna about 1 mm.

Rostrum yellow; palpi brownish black. Antennae with scape yellow, pedicel testaceous, flagellum brownish black to black; basal two flagellar segments fused, succeeding ones oval, the outer segments more elongate, a little shorter than the verticils. Head clear light yellow.

Pronotum yellow. Mesonotal praescutum almost covered by three reddish brown stripes, the ground color yellow, interspaces narrow; pseudosutural foveae reddish brown, inconspicuous; posterior sclerites of notum yellow, scutal lobes extensively reddish brown. Pleura chiefly yellow, variegated on ventral sternopleurite and meron by reddish brown areas. Halteres pale, knob clear light yellow. Legs with coxae yellow, trochanters more obscure yellow; remainder of legs pale brownish yellow to light brown, the outer tarsal segments slightly darker. Wings subhyaline, prearcular and costal fields more yellowed; veins pale brown. Macrotrichia on veins beyond cord, including R_4, all of distal sections of R_5 and M_{1+2}, more restricted on M_3 and M_4. Venation: *Sc* long, Sc_1 ending about opposite two-thirds the length of the long *Rs*, Sc_2 apparently atrophied; vein R_3 perpendicular, separated from R_{1+2} at margin by a distance a little less than its own length; vein R_4 nearly as long as R_{2+3+4}, very gently arcuated; cell *1st* M_2 gently widened outwardly; *m-cu* unusually far basad, about one-third to one-fourth its length beyond the fork of *M*; cell *2nd A* pointed at outer end.

Abdomen yellow, segments with a narrow but conspicuous brown basal ring; hypopygium yellow. Male hypopygium with the spines of outer margin of outer dististyle relatively few but conspicuous, the terminal spine very large, decurved; inner style strongly narrowed at tip. Gonapophysis relatively stout, the slightly expanded elongate apical blade subacute at tip.

Habitat. CALIFORNIA. *Holotype:* ♂, South Fork of Kings River, Kings Canyon National Park, Fresno County, 4,500 feet, July 20, 1957 (Alexander).

The most similar regional species is *Rhabdomastix* (*Sacandaga*) *trichophora* Alexander, which differs especially in the venation and in the structure of the male hypopygium, particularly the dististyles. Associated crane-flies along the Kings River included *Pedicia* (*Tricyphona*) *aperta* (Coquillett), *Dicranota* (*Rhaphidolabis*) *querula* Alexander, *Erioptera* (*Arctoconopa*) *cinctipennis* Alexander, *E.* (*Psiloconopa*) *bisulca* Alexander, and *Molophilus* (*Molophilus*) *perflaveolus* Alexander.

Biting Midges (Culicoides spp.) from Catbird Nests at London, Ontario

By W. W. Judd, Department of Zoology, University of Western Ontario, London, Ontario

In two communications recently published (Judd, 1954, 1957) accounts were given of the occurrence of biting midges, *Culicoides* spp., in nests of catbirds, *Dumetella carolinensis*, at London, Ontario. The presence of these flies in two separate nests in two different years, 1953 and 1955, indicated that there might be an habitual relationship between *Culicoides* and the catbird, especially in view of the fact that the flies in one nest (Judd, 1954) were engorged with blood. Accordingly, an opportunity was taken in 1958 to examine more nests of catbirds in London to see if *Culicoides* occurred in them.

The site in which the catbirds nested in 1958 was an abandoned brickyard in northeast London about three miles east of the localities in which *Culicoides* were found in nests previously. The brickyard is about twelve acres in area and is bounded by Cheapside, Taylor, Victoria and Adelaide Streets, all these streets having houses on them with their backyards extending toward the interior of the brickyard. The brickyard is overgrown with trees, weeds and shrubs which provide nesting sites for birds and at its lowest point, near the centre, there is a small cat-tail marsh occupied by *Typha angustifolia* and fed by a meagre stream which flows sluggishly through black muck into the marsh. Three catbird nests were found in the brickyard and after the succession of egg-laying and hatching had been followed and the young birds had left the nests, the nests were collected and insects were removed from them.

1. This nest was four feet from the ground in a raspberry bush. Four eggs were laid successively on May 19, 20, 21 and 22. By June 9 there were four young birds in the nest and they had left by June 16. No flies were found in the nest.

2. This nest was four feet from the ground on top of the stub of a willow tree about 5 inches in diameter and was sheltered

by overarching vines. Four eggs were laid successively on May 20, 21, 22 and 23. There were four young birds by June 9 and they had left by June 16. No flies were found in the nest.

3. This nest was four and a half feet from the ground in a bush of twin honeysuckle. Three eggs were laid successively on May 22, 23 and 25. There were three young birds by June 9. One bird left the nest on June 16 and the other two on June 17. When the nest was collected on June 17 two biting midges, engorged with blood, were found in the debris in the bottom of the nest. The two midges are retained in the collections of the Department of Zoology, University of Western Ontario.

The midges were identified by Dr. W. W. Wirth, Entomology Research Branch, U. S. Department of Agriculture, one as *Culicoides haematopotus* Mall. and the other as *C. biguttatus* (Coq.). Both these species occur commonly in eastern North America (Foote and Pratt, 1954; Coher *et al.*, 1955). A likely breeding place for the flies was the mud along the stream which passed a few yards west of the bush in which the nest yielding the midges was built. Wirth and Bottimer (1956) report rearing *C. haematopotus* in particular from mud at pond and stream margins.

References

Coher, E. I., W. W. Wirth and H. Knutson. 1955. Mosquito News 15: 153–155.

Foote, R. and H. D. Pratt. 1954. Public Hlth. Monogr. No. 181: 1–53.

Judd, W. W. 1954. Can. Field-Nat. 68: 122–123.

——. 1957. Entomol. News 68: 32–34.

Wirth, W. W. and L. J. Bottimer. 1956. Mosquito News 16: 256–266.

Collembola from Pennsylvania

By Harold George Scott [1]

Between December 1948 and August 1959, observations were made on two species of springtail insects occupying soil at the base of a locally potted commercial *Poinsettia pulcherrima* at Philadelphia, Pennsylvania. The plant was heavily infested with the citrus mealybug, *Planococcus citri* (Risso) (Hemiptera, Coccidae). The Collembola involved were both from the suborder Arthropleona, family Entomobryidae. Specimens will be deposited at the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Subfamily Isotominae Schaffer

Spinisotoma (Frisonia) veca Wray, 1952

The Pennsylvania specimens agree with the description by Wray (1952) except that they are larger. Wray reports 0.8 mm. length, but many of the Pennsylvania specimens reach 1.0 mm.

Distribution. Ill., Penna. This species has not been recorded previously from Pennsylvania.

Subfamily Entomobryinae Schaffer

Entomobrya atrocincta Schott, 1896. Figure 1

A great deal of confusion has existed regarding the species of this genus for many years. For this reason the following diagnosis is presented.

Diagnostic Characteristics. Elongate, segmentation distinct; setae present, scales absent; integument smooth; white to yellow with brown, blue, purple or black dorsal and lateral spots, bands or both; antenna 2½ times length of head; eyes 8

[1] Training Branch, Communicable Disease Center, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

and 8 on dark eyepatches; prothorax reduced, naked dorsally; without double row of smooth bristles on inside of tibiotarsus; 1 tenent hair; inner edge of unguis split longitudinally; unguis with 1 outer, 2 lateral, and 6 marginal teeth; unguiculus slender, lanceolate, untoothed; Abd IV 4–5 times III; dentes dorsally crenulate; mucro with apical teeth, anteapical spine, and basal spine; length 2 mm.

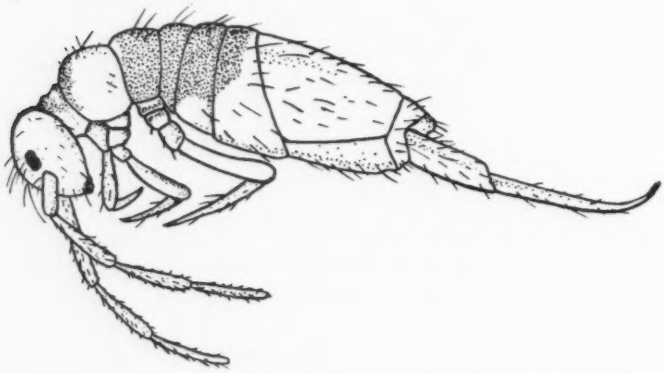


FIG. 1. *Entomobrya atrocincta* color form *clitellaria*.

DISTRIBUTION. Cal., Ill., Iowa, Md., Mass., Minn., N. Y., Penna., Utah, Ontario (Canada), Europe, South America, Australasia.

DISCUSSION. This species, a common household insect, is divided into seven color forms by Maynard (1951, pp. 145–155). The Philadelphia specimens approximate Maynard's *Entomobrya atrocincta* f. *clitellaria* (= *Entomobrya clitellaria* Guthrie, 1903) (Fig. 1). This form has not been reported previously from Pennsylvania, but Maynard (1951) took three other forms of the species (f. *albicollis*, f. *atrocincta*, and f. *nigrocincta*) by sweeping honeysuckle in July at Heidlersburg, Adams County.

SUMMARY

Two Collembola, *Spinisotoma veca* and *Entomobrya atrocincta* color form *clitellaria,* are reported from soil at the base of a commercial *Poinsettia pulcherrima* at Philadelphia. Both are new records for Pennsylvania.

REFERENCES CITED

GUTHRIE, J. E. 1903. Geol. Nat. Hist. Surv. Minnesota, zool. ser. no. 4, vi + 173 pp.

MAYNARD, E. A. 1951. The Collembola of New York State. Ithaca: Comstock Pub. Co., xxii + 339 pp.

SCHOTT, H. 1896. Proc. California Acad. Sci., ser. 2, 6: 169–196.

WRAY, D. 1952. Bull. Brooklyn Ent. Soc., 47: 95–106.

Centennial Celebration

The celebration of the one hundredth anniversary of the founding of the American Entomological Society will be held on Thursday, March 26th. On that day the Society will have open house at the Academy of Natural Sciences, from 10 o'clock until noon. At one o'clock an informal luncheon will be served in the library of the Academy to members and invited guests, and in the afternoon, at 2:45, there will be a panel discussion, also in the library, on the Rôle of the Smaller Entomological Societies. Participating panelists will be: Mr. Curtis W. Sabrosky, Moderator, Dr. Charles P. Alexander, Dr. Ross H. Arnett, Jr., and Dr. John B. Schmitt.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nichiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Domminck J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

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A TAXONOMIC STUDY OF THE NORTH AMERICAN LICININI WITH NOTES ON THE OLD WORLD SPECIES OF THE GENUS DIPLOCHEILA BRULLE (COLEOPTERA)

By George E. Ball

258 pages of text, 75 tables, 3 diagrams, 15 plates, table of contents and index

This monograph considers the geographical variation, relationships, evolution and taxonomy of the carabid tribe Licinini. A general treatment, explaining the taxonomic approach used, definition of terms, criteria for delimiting species and subspecies, etc., precedes the systematic position. The genera *Diplocheila* (subgenera *Diplocheila, Neorembus, Isorembus*), *Dicaelus* (subgenera *Paradicaelus, Dicaelus, Liodicaelus*) and *Badister* (subgenera *Badister, Trimorphus, Baudia*) are each treated in some detail. Keys to the genera and species are given throughout as well as a description (or diagnostic notes), variation, distribution and frequently locality records for each of the forms treated. The phylogeny and zoogeography of each genus are discussed in a separate section. Variation of mensurable characters is treated in the 75 tables. Fifteen plates depict structural (including genitalia) and variational features of the species discussed.

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